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(54) Method for changing the configuration of data packets

(57) A method for changing the configuration of data packets is proposed in which a field, which is inserted in the data packet of the source, indicates the configuration change, e.g., the change of the error protection or the data packet length.

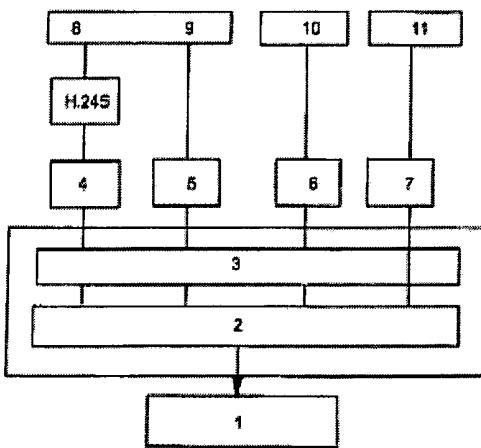


Fig. 1

Description

Prior Art

The invention is based on a method for changing the configuration of data packets in accordance with the class of the main claim.

From ITU-T Draft Recommendation H.223 Annex A "Multiplexing Protocol For Low Transmission Rate Mobile Communication" a data protocol is known, which specifies a multiplexing process by means of which digital information of various data sources enables serial transmission via errored channels. In this protocol the basic structures, the formats of data and control fields, and a structure for the data of the multiplex protocol are determined, which is to be transmitted by the multiplexer. The multiplex protocol enables processing logical information into a uniform data packet, which enters the multiplex level via the adaptation level. The protocol enables the transmission of any combinations of digital audio and video data or other information via a data line. For the purpose of general recognition, said protocol applies a synchronization pattern before each multiplex packet. A HEADER and the information field with fixed packet length are added to said protocol. The data packets have fixed lengths, by means of which a particularly stable synchronization is achieved. The data packets also comprise error protection measures extending beyond the HEADER and/or the information field. Each known error protection measure is performed at the expense of the data transmission bandwidth. During the connection, set-up data is transmitted via a control channel, which signals to the receiver the error protection provided in the multiplex packet and the packet length that will be transmitted. With the known multiplex protocols, error protection measures cannot be adjusted to the respective transmission data.

Advantages of the invention

By contrast, the method according to invention with the characterizing features of the main claim has the advantage that a configuration change of the data packet can occur during transmission, in that the change is announced via the control channel and marked by any field in the data packet. Consequently, the bandwidth of the data transmission can be utilized considerably better, because the error protection measures can be adapted to the transmission conditions.

The measures listed in the subordinate claims are particularly advantageous developments and improvements of the method specified in the main claim.

Preferably, the change in the error protection by changing the value of a bit is announced in the HEADER of the multiplex packet or in the source packet.

In order to adapt the various transmission conditions, it is an advantage, by setting a bit to indicate the change of the data packet length in the HEADER.

It is also possible to indicate the change of the error protection via the HEADER COUNTER, without an additional change in the HEADER structure.

The HEADER COUNTER may preferably be used for displaying the change of the data packet length. Consequently, it is an improvement to announce the change for the n-te data packet. The configuration may be changed via an additional counter field, which also may be used for an extended preparation for the change.

Furthermore, it is an improvement to display the change of the configuration of the data packet in the HEADER of the source packet, rather than in the HEADER of the multiplex packet.

Drawing

An embodiment of the invention is shown in the drawing and is explained in detail in the following description. Of the drawings

Figure 1 shows the structure of the data levels for the multiplex data transfer,

Figure 2 shows a multiplex packet,

Figure 3 shows the structure of the HEADER of the source packet, and

Figure 4 shows the structure of the HEADER of the multiplex packet.

Description of the embodiment

According to Figure 1, the data transfer of any data signal is effected via hierarchically subdivided levels. The signals, which in part are analog, are transmitted by the individual data terminals via the application levels 8, 9, 10, 11 to the coordination levels 4, 5, 6, 7.

Subsequently, the contents of the logic channels are transmitted to adaptation level 3 of the multiplexer. Data is transmitted in logic channels, which are still separated, to multiplex level 2. This level processes the multitude of logic channels into a single logic channel and logs multiplex protocol data units (mux PDUs).

Each mux PDU is filled with source information. Table sources for the data transmission process are, for example, audio sources 10, video sources 11, which were encoded at the coding level.

In addition to the individual data sources, a control channel 4 exists which predetermines the specifications of the protocol. The standard for the control channel is designated as H.245.

Figure 2 shows the general format of a multiplex packet, as combined at multiplex level 2 and adaptation level 3. The multiplex packet consists of a synchronization word 21, the HEADER 22 and the information field 23. In the HEADER of the multiplex packet, the information is relayed by further processing of the information field. The field 24 contains the multiplex code, and subsequently a field HC, i.e. the HEADER COUNTER 25, is transmitted. In order to protect the HEADER against transmission errors, two additional codes of the CRC (Cyclic Redundancy Code) and FEC (Forward Error Correction) are transmitted. The information field of the multiplex packet contains the source packets 28, which are packed at the adaptation level 3. The source packets may originate from various sources and may consist of various lengths. The individual source packets again consist of a HEADER 29 and the information field 30. The HEADER of the source packet also contains error-correcting codes, namely CRC 31 and FEC 32. The actual information field 33 contains the pure data and a variable error protection.

The HEADER field of the multiplex packet 22 specifies how the subdivision of the information field of the multiplex packet 23 is filled for the various information sources, i.e., in what ratio the information of the sources is filled into the information field 23. The field HC 25 designates a forward or reverse counter, which indicates how many multiplex packets with similar packet lengths are still to be transmitted and/or have been transmitted, in order to ensure an error-resistant transmission via a large variety errored data channels, the information of the different sources 33 is provided with a flexible error protection. During the connection setup, the receiver is signaled the extent of error protection for the information of a data source via a so-called control channel 4. For the various applications, it is desirable to change the error protection during a transmission, in order to enable an optimal adaptation to various transmission conditions.

If the receiver, for example, is located below a screening bridge, the error protection for data transmission should be increased. On the other hand, if the receiver moves very slowly or is in the direct vicinity of the transmitter station, the error protection can be reduced, and consequently the bandwidth can be increased. There also is the option of signaling the receiver a new configuration of the error protection via the control channel 4, but since the control

channel has no time correlation to the data of the sources, it is unable to transmit when the first packet with the modified new error protection will be transmitted. For a correct decoding of the received data packet, however, it is indispensable that the type of error protection already is known with the first data packet received. Therefore, according to the inventive method, a bit is defined in the HEADER of the source packet, which signalizes the error protection change.

Figure 3 shows a sketch of the HEADER of a source packet 29. A field CC (configuration change) 34 is defined in the HEADER. At the start of a transmission, this bit is set to a defined value, e.g., "0." During the connection, a configuration change for a data source can be signaled via the control channel to the receiver, that is, for example, an increase of the error protection for a data source. According to the protocol of the control channel, the receiver transmits to the sender an acknowledgement of this modification request. After the sender has received this acknowledgement, the sender will be able to use the modified error protection in the next packet to be transmitted. In this packet, the CC bit is set to "1." The receiver will recognize the first packet with the modified error protection. In all subsequent packets, the CC bit will remain at "1," until the sender requests a new configuration change. After the receiver's acknowledgement, the new configuration of the CC bit is reset to "0" in the first packet.

Likewise, the change of the error protection for an entire multiplex packet can be signaled via a CC bit in the HEADER of the multiplex packet.

In order to ensure an error-resistant transmission, the multiplex packets have a fixed length. Frequently, it is desirable to change the packet length during a transmission. This enables a flexible adjustment to varying channel conditions. A new packet length can be signaled via the control channel.

In this case, there is also the problem of the receiver not knowing the exact time of receiving a packet with a new length. By introducing the CC bit into the HEADER of the multiplex packet, the start of packets with a new length can be signaled. Similar to data packets of individual sources, the CC bit in the multiplex packet is set to "0" at the start of a transmission. After the transmitter has requested the change of length and the acknowledgement by the receiver via the control channel, the CC bit in the first packet with the new length is set to "1." It remains on "1" until a new change occurs. In previously described embodiments, configuration changes relating to both the changes of the error protection and to a change of the packet length were indicated via a special control bit (CC 34).

Another embodiment selects the existing HEADER COUNTER (HC) 25 to display a configuration change. The HC field transmits a counter, which is incremented and specifies how many multiplex packets with identical multiplex codes are still to be transmitted. This method of inverse counting can also be used to signal the receiver when a change of the length of the multiplex packet will be effected. After the receiver has received the acknowledgement of the request to change the length from the receiver, the HEADER COUNTER can be set to a specific value. If the counter status "0" is reached, the actual change in length will be performed. By means of this counter, the receiver can predict the change of length and consequently a more error-resistant transmission can be achieved than with the CC bit.

For a multiplex packet, it is extremely desirable to be able to change the synchronization word SYNC, the force of the error protection for the HEADER or the size of the CRC field. This change of parameters can be signaled via the control channel. For the purpose of signaling the realization of a change of these parameters, the CC field cannot be used, because when changing the error protection for the HEADER, this field cannot be decoded without knowing the new parameter.

When using the HEADER COUNTER, however, the receiver, similar to the above-described method of indicating a change in length, is able to predetermine the first packet with the new configuration.

Furthermore, the original function of the HC field can be maintained by allocating a separate counter to the HEADER. Furthermore, with this counter being in the HEADER, configuration changes in the source packets may be signaled. Further, a counter may also be used in the HEADER of the source packet to signal the configuration changes. The counter then will be able to signal the parameter changes of the source packet HEADER, i.e. similar to the HEADER of the multiplex packet, the error protection of the source packet HEADER can be configured. Moreover, a counter can be transmitted in any field within the source packet, in order to signal the configuration changes in advance. A special multiplex or source format is not required. By using a special field, either in the HEADER of the multiplex packet or in the source packet, a flexible adaptation to the varying channel status changes can be achieved. This enables an efficient utilization of the channel's existing bandwidth.

Claims

1. A method for changing the configuration of data packets, which are transmitted between two stations, in which the data packets comprise a synchronization pattern SYNC (21), a HEADER (22), and an INFORMATION field (23), and in which control data is transmitted, which contains information relating to the processing of data packets, wherein a change of the configuration of the data packets is announced via the control data and a field is transmitted in the data packets, the content of which indicates a change of the configuration for the transmitted data packet and/or the subsequently transmitted data packets.
2. A method for changing the configuration of data packets as defined in claim 1, wherein the HEADER (22, 29) of the data packets contains a bit, which is set or reset when changing of the error protection.
3. A method for changing the configuration of data packets as defined in claim 1 or 2, wherein the HEADER (22, 29) contains a bit, which is set or reset when changing the data packet length.
4. A method for changing the configuration of data packets as defined in claims 1 to 3, wherein the counter of the HEADER COUNTER (25) field displays a change of the error protection in advance.
5. A method for changing the configuration of data packets as defined in claims 1 to 4, wherein the counter of the HEADER COUNTER (25) field announces a change of the data packet length in advance.
6. A method for changing the configuration of data packets as defined in claims 1 to 5, wherein the counter of the HEADER COUNTER (25) field indicates a change of fields in the HEADER in advance.
7. A method for changing the configuration of data packets as defined in claims 1, 4 to 6, wherein for the purpose of signaling configuration changes of a multiplex packet (21, 23) and a source packet (28), a counter consisting of an n-bit is transmitted in a field of a multiplex packet or source packet, in which the counter indicates how many packets or data is still to be transmitted with the old configuration.

- 8.** A method for changing the configuration of data packets as defined in claims 1 to 7, wherein the change of the configuration of the source packet is indicated in the HEADER of the source packet.
- 9.** A method for changing the configuration of data packets as defined in claims 1 to 7, wherein the change of the configuration of the source packet is indicated in the HEADER of the multiplex packet.